Center Innovation Fund: GSFC CIF

Deformable Mirror for Spaceflight

Completed Technology Project (2015 - 2016)

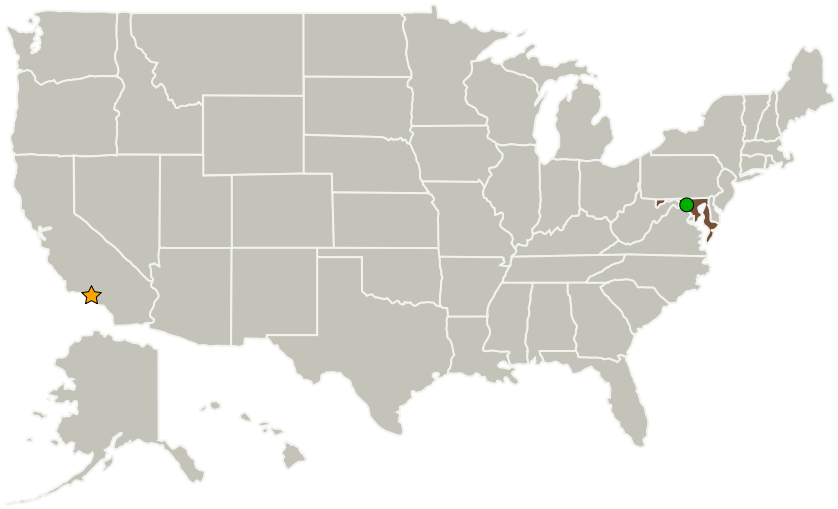
Project Introduction

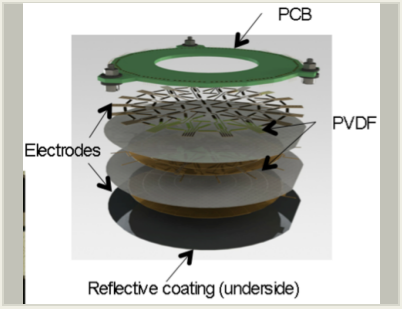
The specific objective of this IRAD is adapting a precision glass slumping technology that GSFC has developed for making grazing incidence mirrors for making normal incidence mirrors. These mirrors, extremely thin (0.2mm) and lightweight (0.5 kg/m2), will be sent to Dr. Keith Patterson at JPL and colleagues at Caltech who will attach precision actuation mechanisms on their backs to adjust their focus and other characteristics, making them fully diffraction-limited at 500nm wavelength. The requirements on the mirror substrate are: They must be no more than 0.2mm thick, because of both a desire to have a lightweight mirror and the fact that the actuation mechanism has a very limited dynamic range, which is inversely proportional to mirror substrate thickness. They must be diffraction-limited at all but the lowest spatial frequencies. In practice, this means that any deviation from the mathematic prescription must be well below 20 nm. This is because the actuation mechanism is not effective in removing errors with spatial periods shorter than about 20mm.

Anticipated Benefits

N/A

Primary U.S. Work Locations and Key Partners





The elements of a deformable mirror.

Table of Contents

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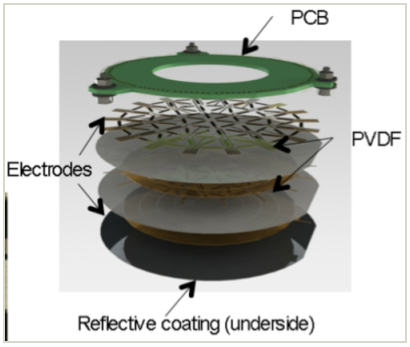
Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
●Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations
Maryland

Images



Deformable Mirror
The elements of a deformable mirror.
(https://techport.nasa.gov/image/19140)

Project Website:

http://sciences.gsfc.nasa.gov/sed/

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Center / Facility:
Jet Propulsion Laboratory (JPL)

Responsible Program:
Center Innovation Fund: GSFC CIF

Project Management

Program Director:
Michael R Lapointe

Program Manager:
Peter M Hughes

Project Manager:
Stan Hunter

Principal Investigator:
William W Zhang

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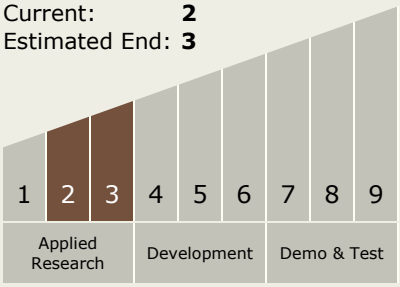
Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **3**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.2 Observatories
    - TX08.2.1 Mirror Systems